Modeling the Delta Smelt Population of the San Francisco Estuary

Wim J. Kimmerer

Final Selection Panel Review

Proposal Title

#0106: Modeling the Delta Smelt Population of the San Francisco Estuary

Funding:

Fund in part
Amount: **$997,027**

The final Selection Panel concurred with its initial findings on this proposal. Due to the reduction in funds available for the Science Program's 2004 PSP, the Selection Panel recommended funding for this proposal be reduced by 10%. Should the California Bay–Delta Authority accept the Selection Panel's recommendation and approve the funding of this proposal, the applicant will be allowed to negotiate which tasks and associated costs will be reduced by 10% as part of the contracting process.

Public Comments

No public comments were received for this proposal.

Initial Selection Panel Review

Proposal Title

#0106: Modeling the Delta Smelt Population of the San Francisco Estuary

Funding:

Fund
Amount: **$1,107,027**

Initial Selection Panel (Primary) Review

Topic Areas

- Life Cycle Models And Population Biology Of Key Species
- Environmental Influences On Key Species And Ecosystems
- Relative Stresses On Key Fish Species
- Direct And Indirect Effects Of Diversions On At−risk Species

Please describe the relevance and strategic importance of this proposal in the context of this PSP. How does the proposal address the topic areas identified above? What are the broader CALFED Goals this proposal may meet that are not accounted for in these specific topic areas?

The proposed project is directly relevant to the first two priorty topic areas identified in the PSP: 1) understanding the linkages between water operations and biological resources, and 2) learning how natural ecological processes work, and links between these prcoesses, resource management actions and populations of key species. Further the PSP considers delta smelt a key at−risk species. The strategic importance of this project is in the development and linkages of three modeling approaches that will provide a population−level framework for indentifying bottlenecks in the life cycle and the influence various factors/stressors may have at the population level. The models will also provide an explicit framework for application of existing monitoring data and clearly identify where gaps in knowledge and sampling

exist. The proposed project will also contribute value tools and insight into the broad CALFED goals of ecosystem restoration and water supply reliability.

The budgets of proposals submitted in response to this PSP are larger, on average, than those submitted to CALFED in previous years. The Science Program is committed to getting as much science per dollar as is reasonably possible. With this commitment in mind, can the proposed budget be streamlined? If so, please recommend and clearly justify a new budget total in the space provided.

As noted by one of the technical reviewers, much of the budget is dedicated to labor. My general examination suggests there is not much that can be done to streamline the labor budget. I do think the travel budgets are too high. The proposal requests funding for all CA project staff to travel to Louisiana to meet and confer with the one Louisana PI. I recommend working with the PI's to streamline the travel portions of the budget. There is also some question about expenses for supplies and publication costs. For example publication costs range from 0−$3500 among Stanford, SF State, and UCD. A lot of this may be in the way costs were grouped. I believe these relatively minor budget issues could be resolved in preparing the scope of work for a contract.

Evaluation Summary And Rating.

Provide a brief explanation of your summary rating and any additional comments you feel are pertinent.

I strongly recommend funding this proposal. Modifications I recommend pursuing are: 1) clarifying some of the budget detail, especially the travel costs, and 2) clarifying the schedule of tasks for each model. For example, the proposal states the PTM results will be used to inform the locations of boundaries for boxes in the IBM. Does this affect the timing of PTM modeling relative to IBM coding? Also, the schedule seems to assume the post−doc working on the IBM will start at the same time the contract starts. I suspect some contract lead time will be needed to advertise and select the post−doc. Also, it is not clear who will pay for recruitment of the post−doc. 3) As noted in the collaborative review comments, it

is not clear how responsibility for the synthesis paper is assigned. Kimmerer is noted as the managing PI, but functions in this role are not explicitly defined. Overall, these are relatively minor details that can be worked out in the development of the scope of work. The substance of this proposal should be funded as is.

Selection Panel (Discussion) Review

fund this amount: $**1,107,027**
note:
fund

This project will produce individual−based and stage−based models of Delta smelt population dynamics. In addition, the proponents will examine an existing particle tracking model which will also be used to inform various aspects of the population models. Delta smelt are a key species of concern. Also, the proposal addresses two key aspects of the Science Solicitation:

(1) Understanding the linkages between water operations and biological processes and water management.

(2) Learning how natural and ecological processes work and links between these processes, resource management actions and populations of key species. The modeling will provide important information about gaps in our current understanding of this species ecology. It is also likely to provide insight into ways of improving current monitoring.

The panel was unanimous that this research is important and overdue. The panel felt that the proponents are extremely qualified to conduct this work. There were minor concerns about certain budget issues, including: funding of travel for several trips to Louisiana and the timing of the post−docs employment. However, these amounted to a small fraction of the total budget and the panel believed they could all be addressed during the contract process.

Collaboration Panel Review

Proposal Title

#0106: Modeling the Delta Smelt Population of the San Francisco Estuary

Final Panel Rating
above average

Collaboration Panel (Primary) Review

Collaboration:

Will the results of the collaborative effort be greater than the sum of its parts? Is it clear why the subprojects are part of a larger collaborative proposal rather than several independent smaller ones?

above average
Yes, there is clearly a need to share resources, information and expertise to accomplish this project.

Interdependence And Integration:

Does the proposal have an example that clearly articulates the conceptual model of each subproject and how they link together as a whole? Are the boundaries of the study plans focused and cohesive, yet well delineated? Is there a plan for potential differences in the stages of subproject completion times? Are there clear plans for analyses and interpretations which seek to identify and quantify relationships among the data collected in various subprojects rather than separate analyses for each subproject?

above average
Yes, proposal clearly links the models. I didn't find a plan the possibility for differences in completion times. There is discussion of the analyses and interpretations that are planned.

Project Management:

Is it clear who will be performing management tasks and administration of the project? Are

there resources set aside for project management and time given for investigators to collaborate? Is there a process for making decisions during the course of the project? Are there acknowledgments of potential barriers to collaboration and explanations of how team members will overcome barriers particular to their institutions?

adequate
It is clear who is performing project management, but I did not find a description of how resources and time had been set aside for project management and collaboration. It is also not clear how decisions will be made or how barriers will be overcome.

Team Composition:

Does the lead principal investigator have successful management history and experience leading collaborative teams? Is it clear that all key personnel are committed to making significant contributions to the project? Do team members have complementary skills?

adequate
While the lead PI has extensive research and CALFED Science experience, I did not find a description of his management history or experience leading collaborative teams. Though a synthesis paper is proposed as a deliverable, it is not listed as a task nor is there indication of who may be responsible for that paper. Team members do have complementary skills and seem committed to contributing to the project.

Communication Of Results:

Is there a clear plan for comprehensive and cohesive reporting of project progress to the CALFED community?

adequate
The proposal commits to providing the computer code, a report the CALFED Science, presentations to CALFED Science Conference, EET and 1 national conference (not named), EWA workshops, Water Operations Management Team, an article in the IEP Newletter and 4 manuscripts submitted to peer−reviewed journals (1 will be San Francisco Estuary and Watershed Science). I lowered this rating to adequate from above average because of the question about the synthesis paper.

Additional Comments:

Important to encourage this collaboration. Perhaps the addition of a Project Manager and description of the process of sythesis paper development could greatly increase the value of this proposal.

Collaboration Panel (Discussion) Review

Primary rated most categories as above average, but judged that project management was only adequate because there was no description of how resources and time were set aside in budget. In addition, although the PI has experience,it was not with collaborative teams.

Secondary reviewer recognized it is a large, complicated project. Again, project management was adequate, although there was no lead scientist identified. Communication and results was adequate as well; all other categories judged as superior.

Reviewers and panel were in agreement on the specific deficiencies and strengths of the project, and judged the final rating above average.

Technical Synthesis Panel Review

Proposal Title

#0106: Modeling the Delta Smelt Population of the San Francisco Estuary

Final Panel Rating
superior

Technical Synthesis Panel (Primary) Review

TSP Primary Reviewer's Evaluation Summary And Rating:

The threatened delta smelt is arguably the most important species for management and restoration in the San Francisco Estuary. Singularly dependent on the SacramentoSan Joaquin Delta and Suisun Bay, delta smelt is highly vulnerable to entrainment in export pumping facilities. The management attention to this fish has led to some important advances in our understanding of its population dynamics, and to improvements in how this species is monitored. However, we lack population models necessary to extend and test the scope of our present knowledge, and to quantitatively explore management alternatives. It is therefore timely to develop and apply computer models to the delta smelt population. Such models can be useful in organizing the available information and placing it in a population context, pointing out key information gaps, and investigating the implications of alternative management strategies. 1. Goals: The three technical reviewers and I agree that the goals are clearly stated and timely. The goal is to create a comprehensive model of delta smelt to allow for evaluation of potential management options. Given the currently endangered status of this species, its apparently important role in the San Francisco Estuary, and the seeming abundance of data available on this species, the topic seems very important. 2. Justification: The study is justified relative to existing knowledge. There is a

great deal of data available on delta smelt, and this study will seek to put all the data together into a comprehensive model that will be useful in making management decisions. The authors presented no clear hypothesis, but they did provide some helpful conceptual models of their proposed approach. The combined use of the three different types of models is very appropriate given the goal and objectives. 3. Approach: The approach is appropriate and results are likely to add information to the knowledge base. The information will be valuable to decisions makers, as it will provide a means of evaluating the results of potential alternative management actions. The three technical reviewers and I agree that the three−model approach is appropriate and likely to succeed. One potential difficulty that was identified was the amount of communication that will be needed to perform this study. Different people will be working on the three different models, but each model also needs information from the other models, so coordinating modeling efforts will be critical. The authors are aware of this difficulty and seem prepared to address it. Other favorable aspects of this study are the intended consolidation of the results of the three models and the fact that a workshop was used to address desired outcomes of the model. 4. Feasibility: The study is very likely to produce a working model, but the utility of this model remains to be seen. The model will likely be useful to managers because it will allow them to evaluate the outcomes of alternative management actions. One major factor that should contribute to success is the abundance of data that seems to be available. The authors also seem capable of working together in creating the models. Specifics were not given on how the three models will be integrated, but this seems reasonable. The scale is consistent with the objectives and within the authors' capabilities. 5. Monitoring: NA 6. Products: The study is likely to produce data and models that will be valuable to managers. The authors plan on making data and models available to interested parties, but they were unclear on exactly how they would do this. The results will likely be quite worthy of publishing. One technical reviewer suggested that the authors write an article for a magazine readily accessible to the public, such as California Agriculture or Western Water. 7. Capabilities: The authors

appear capable of performing this study. Given the three models, it makes sense to combine their individual strengths in the different models. 8. Budget: The budget is very large for this type of study. However, it is being used to acquire excellent and experienced individuals.

Additional Comments:

All three technical reviewers seemed to put a significant amount of time and effort into their reviews. All three agreed on much of their evaluations, and I tended to agree as well. The reviewers seemed qualified regarding subjects related to the proposed study. The reviewers agreed that the proposal was very well done, and the entire modeling process seemed well thought out. They feel that the team of authors is likely to succeed with the proposed study. On average, they rated the proposal as very good to excellent.

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readily accessible to the public, such as California Agriculture or Western Water. 7. Capabilities: The authors appear capable of performing this study. Given the three models, it makes sense to combine their individual strengths in the different models. 8. Budget: The budget is very large for this type of study. However, it is being used to acquire excellent and experienced individuals.

Technical Synthesis Panel (Discussion) Review

TSP Observations, Findings And Recommendations:

This proposal was extremely clear and well written. It provided excellent justification for use of 3 different modeling approaches to synthesize existing knowledge, and test hypotheses about factors influencing Delta Smelt, a sentinel species at risk in the Bay area. The authors provided a thorough description of data available for the models, and overall structure, strengths and weaknesses of each model. Particularly helpful was the use of figures to explain differences in spatial and temporal scales, and questions suitable for addressing with these models. They also described how results from one model would be used as inputs or constraints for simulations of other models.

The level of integration and preparation for this modeling effort is high. The need for modeling delta smelt was recognized at a CALFED workshop earlier. Reviewers felt that managers would be involved throughout the project with workshops being held to evaluate various water and fishery management options. The team of researchers are all expert in their respective areas, and dedicated to a coordinated, integrated project One concern was how the team would make data and models available to the public.

Rating: SUPERIOR

Technical Review #1

proposal title: Modeling the Delta Smelt Population of the San Francisco Estuary

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	**The investigators make a strong case that the proposed models are timely given the amount of existing information on the biology of the delta smelt. They propose to take advantage of existing modeling methods to increase our understanding of delta smelt ecology and vulnerability to export flows in the south Delta. The first three research objectives which focus on model development are clearly outlined and the methods are extremely well-developed. Using a spatial hydrodynamic model previously developed by DWR (DSM2) and a particle tracking model (PTM) to simulate the transport of delta smelt larvae in various flow conditions appears to be particularly useful given the problems that entrainment of larval fish by pumping facilities presents. If in fact there is more biological information available on delta smelt, such as the relationship between body size and fecundity, then improving existing individually based models (IBM) may be useful. It is difficult to test the sensitivity of these models to the input parameters; however, the integration of these models with the hydrodynamic model will prove to be very useful. Stage-based matrix models have already been developed for this system but given the simplicity and power of these methods it is important that these models be developed further as proposed. Additional sensitivity analysis is needed and comparisons with the IBM may result in powerful converging results or point to areas of uncertainty. While the relative importance of**

	biological variables in need of investigation can be examined using IBM, it appears that these variables may be addressed better in a complimentary proposal submitted by Kimmerer and colleagues on foodweb support for delta smelt. I appreciate the cautionary approach the investigators have taken to the last two management objectives. They stress that research into model development is the primary purpose of this proposal and will enhance our understanding of the ecology of this species which is a necessary step to predicting how resilient a species might be to future alterations of the system. The eventual integration of hydrologic models with population models is the right approach and further development of the proposed models is an excellent step in the right direction.
Rating	**very good**

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full−scale implementation project justified?

Comments	**This proposal is well−justified and clearly builds on existing knowledge. Some of the remaining questions about the delta smelt system will be informed by this research. Increased understanding of the delta smelt population dynamics is critical and the response of larvae to flow changes in the south Delta is important for managing export flows. The proposed modeling approach will provide important synthesis and eventually lead to useful decision−support tools.**
Rating	**very good**

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to

generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	**Concerted effort seems to have been made to increase communication among scientists and practitioners working on this system which is critical to the success of this project and other related efforts. For example, the proposed research addresses two uncertain issues regarding smelt population dynamics that were raised at the workshop. While work related to DSM2 does address larvae transport under different flow conditions, more research will be needed to address the relationship of delta smelt abundance to freshwater flow. More importantly though, it appears that the delta smelt workshop informed the proposed research and hopefully future delta smelt workshops will allow continued feedback among interested parties. In fact, I would strongly recommend that funding for additional workshops be provided by CALFED.** **The scientific approach being proposed to address the first three modeling objectives is well designed. Particularly impressive is the thought put into integration of the models which while less clear is more novel than the proposed models on their own. This research is also the appropriate place to begin to address the later management related objectives.**
Rating	**excellent**

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	**The investigators are highly qualified and have experience with the proposed system. The model development described is feasible but more interesting for scientific development will be what results from model integration. The proposal takes full advantage**

	of existing data at multiple temporal and spatial scales. Model sensitivity to the input data should be tested and where possible uncertainty should be perpetuated through the models and reflected in end results.
Rating	excellent

Monitoring

If applicable, is monitoring appropriately designed (pre−post comparisons; treatment−control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	Not applicable.
Rating	not applicable

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	The proposed products are appropriate. I would only recommend that a popular article for the public on the subject be submitted to a magazine such as California Agriculture or Western Water.
Rating	very good

Additional Comments

Comments

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	**The authors are highly qualified to conduct the proposed research and have the University infrastructure required.**
Rating	**excellent**

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	**Yes**
Rating	**very good**

Overall

Provide a brief explanation of your summary rating.

Comments	**The proposed improvements to existing models and integration among the various approaches will increase our understanding of the delta smelt system.**
Rating	**excellent**

Technical Review #2

proposal title: Modeling the Delta Smelt Population of the San Francisco Estuary

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	**The goals and objectives are clearly stated. There are not clear hypotheses regarding results from the model, but it is hypothesized that the creation of existence of these models will be able to give insight into the relationship of population dynamics of delta smelt to hydrodynamics. While this is well beyond my area of expertise, the idea seems to be very important. The importance of delta smelt as a species is made clear throughout the proposal. Water management actions, particularly regarding Export pumping are currently being taken to preserve the delta smelt without the availability of models that might be used to evaluate the effectiveness of these actions and other potential alternative actions. Because these management options and field experiments relating to delta smelt are hugely expensive, this represents a seemingly valid argument for investing some money into improved models. The authors argue that the idea is very timely because it is only very recently that sufficient data has become available to make the models accurate and comprehensive enough to be useful.**
Rating	**very good**

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full−scale implementation project justified?

Comments	**The study is justified in that there are not currently any models that are this comprehensive. The concept of how the authors see a need for the three proposed types of models and the interaction of these three models is clearly presented. I do not see any potential alternative for the proposed work. They are proposing to create these models, which will either be created or not created. There are no degrees of implementation.** **A conceptual model for the life cycle of delta smelt is presented on page 2 and this is to some extent the basis of the modeling strategy. This conceptual model also shows the relation of available empirical data and factors contributing to the life cycle that will be included in the model.**
Rating	**very good**

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	**I believe that the approach is well-designed and feasible. The creation and integration of the three models in a timely manner will require significant interaction between to collaborators and timely progress on all fronts if the goals are to be met within the proposed three years. This is particularly true with this project because many of the goals are serial in nature, so that aspects of the project cannot even begin until several other objectives are first completed. The authors acknowledge that this interaction is a principal component of the work and propose plans to communicate with one another. They have worked with one another in the past, which is encouraging. I liked the fact that a schedule of progress events was included in the proposal, even**

	though it is noted that dates are approximate. I believe that project management and keeping all of the groups on track will be a significant part of the project and detailed written charts like this will may be necessary. A specific plan for at least eight in-person meetings involving all of part of the group is explicitly stated in the proposal. **I am much more familiar with particle tracking methods than the other proposed models. I believe that particle tracking in order to predict the movement of larval and fish as proposed is very reasonable method for making some predictions of this phenomena. The use of existing detailed flow data and adding effects of vertical swimming, attraction to light, etc. is very feasible. The authors dealing with that portion of the project have an excellent reputation and ideal background for the work.** **The overall approach is well designed and appropriate for meeting the objectives of the project. The modeling project is fairly large in scale, owing to the nature of the question. This is a feasible start to a comprehensive model and the model will be used to compare the effectiveness of difference management strategies and will therefore provide information that would certainly be useful to decision makers.**
Rating	**very good**

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	**Comparisons to real data should be used to ground-truth the model before it is used to compare management methodologies. There is no preliminary work showing the effectiveness of tow of the three models or the integration of them.**

	Success may be difficult to measure. A model will certainly be created. The accuracy and effectiveness of this model is more difficult to predict, but it seems as though the team assembled and proposed integration of three independent models is the best attempt given the current knowledge of this system. The scale is consistent with the objectives and certainly within the grasp of the authors.
Rating	**good**

Monitoring

If applicable, is monitoring appropriately designed (pre−post comparisons; treatment−control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	**This does not involve monitoring.**
Rating	**not applicable**

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	**The most obvious product of the projects is the creation of a model, which the authors say will be made publicly available to the public. The means by which this model will made available is not explicitly stated in the proposal. The current modeling effort builds on existing models, so there is apparently some mechanism in place to transfer these models to interested parties. The interpretive outcomes of the work will be from the runs of the models used to investigate effectiveness of current and alternative management methods.**
Rating	**very good**

Additional Comments

Comments

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	**The funding agency is likely more familiar with the authors than I am. I am familiar with the modeling work of Monismith and he has an excellent track record and is very well qualified for the particle tracking portion of the project.**
Rating	**excellent**

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	**This is a large budget. The majority of the budget is dedicated to development of the Individual Based Model (IBM). The majority of this is for salary to Kimmerer and Rose (part time) and a post doctoral student (part time 1st year and full time 2nd and 3rd years). I am not able to evaluate if this is a reasonable amount of required labor. I feel that the proposed cost (again mostly labor) for the particle tracking effort is reasonable. There is a significant amount of travel money throughout all parts, but if the integration of these models is really going to happen, then significant travel will be required.**
Rating	**good**

Overall

Provide a brief explanation of your summary rating.

Comments	**The proposal proposes to model a major question related to the life cycle of delta smelt. I have very little knowledge of the biological system, but the importance of the species seems evident. I do have experience with modeling, particularly particle tracking methods, which is one of three models proposed to be integrated in this proposal. I believe that this modeling approach will be successful, realizing that the accuracy and precision of the resulting model is hard to predict and may also be difficult to evaluate. The team assembled to approach this modeling problem seems to be ideally qualified.**
Rating	**very good**

Technical Review #3

proposal title: Modeling the Delta Smelt Population of the San Francisco Estuary

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	**This well written, thoroughly explained, and skillfully developed research plan is aimed at comprehensive population modeling of delta smelt to allow evaluation of management options for the conservation of this endangered species. Three models are used for different purposes and the logic and justification of a 3−model approach is clearly explained. Each model will address different aspects of the species biology and population, and each model provides input to the others. This plan fits model capabilities to different needs: largely passive larval transport within the estuary system, population parameters and limitations, and overall dynamics of the population. A sound plan for integrating the work is presented: manage information exchange between three distinct modeling efforts. Overall, the tasks defined in the proposal provide a clear plan for synthesizing data and effects on delta smelt.**
Rating	**excellent**

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full−scale implementation project justified?

Comments	**The proposal provides a clear fit between the state−of−knowledge on the species and the relevant data resources presently available. While considerable field study has yielded data and findings on delta smelt, synthesis of this information has not yet occurred. This makes the proposed study timely because the material for a comprehensive assessment of the species is at hand and the need for population scale synthesis has not been attempted. The authors do an excellent job of describing where information for modeling will come from, and they provide a large tabular presentation of data and information sources. A conceptual model is provided as a life cycle figure that is also explained in the text. Spatial coverage is mapped with supporting information plotted. The coverage of the species habitat and life cycle is complete so a full analysis of impacting factors is likely to be realized in the work.**
Rating	**excellent**

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	**My other comments cover the design aspects of the proposed project. The anticipated outcome is very likely to be new because limitations on the population should be obtained by life cycle stage and location in the estuary. Managers and those making resource allocations in the CALFED program will likely see how to best conserve this species. The authors show a good understanding of the management context and they planned work that go straight at products for conservation action planning.**
Rating	**excellent**

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	**The 3−model approach is well developed and justified in the proposal. A philosophy for integrating three modeling efforts is presented, and a series of tasks to achieve synthesis is described. Information synthesis for a species level assessment is not itemized as a distinct task but instead synthesis is integral in developing each model. Because the models will share information naturally, the project would inherently proceed in a coordinated manner. I found the thinking on how this would be achieved convincing even though details were not given on specific data to be transfered among models. Consequently I judge the likelihood for success to be very high. Plus I was further convinced of feasibility by the clear description of data resources and the efficient use of specialized expertise in a one project effort.**
Rating	**excellent**

Monitoring

If applicable, is monitoring appropriately designed (pre−post comparisons; treatment−control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	**The project does not propose population monitoring because it uses information and data from ongoing monitoring efforts. Nevertheless, I see the total picture of the species provided by this project of great use for those conducting monitoring. I consider the outcome of this work very likely to influence monitoring programs because it will identify key points in the life cycle and occupied estuary system**

	space where the population is controlled.
Rating	excellent

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	In addition to the relevance to monitoring given above, the proposal authors define specific products of their work. Data sets and computer models will be provided for others to use. Also, a set of activities are given for transferring project findings and resources to managers and other researchers. While models and simulations may appear abstract for ready use by managers, I thin this effort will yield tangible and clear results that will have immediate use in efforts to conserve the species. The likely limits on the population would be identified as well as locations of importance in the estuary system.
Rating	very good

Additional Comments

Comments

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	The project team is very accomplished in the different kinds of modeling proposed, and the overall plan uses specialists in a way that integrates their strengths. I see this as a natural outcome of the plan the connects three distinct models. Details on data resources

	further substantiates the feasibility of the project plan.
Rating	**excellent**

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	**The cost of this project is reasonable and clearly justified with cost details. While the total cost is high, it is proper for the range of expertise included, and a proper level of effort is projected for key experts.**
Rating	**excellent**

Overall

Provide a brief explanation of your summary rating.

Comments	**I found this proposal very well done. Not only is the approach carefully planned but care was given to show what data and information would be used and where it will be obtained. The participants are strong in their specialties and they have given real thought to how to work together as one team. The species is clearly important for CALFED and they show a solid understanding of species biology and management issues.**
Rating	**excellent**